APPENDIX 2

P&A PROCEDURE FOR WELLS TO BE ABANDONED PRIOR TO INJECTION

CTV will abandon thirty-three wells within the AoR prior to injection of CO_2 to isolate the A1-A2 sands from other permeable reservoirs and to ensure confinement through the Reef Ridge upper confining layer. Appendix 1 provides the list of all wells within the AoR and indicates which wells will be abandoned prior to injection. This appendix provides the plugging and abandonment procedures to demonstrate that plugging will ensure isolation of the A1-A2 sands.

Abandonment operations will be conducted using methods designed to prevent the movement of fluid into USDW and will include the use of materials compatible with the carbon dioxide stream. As these are oil and gas wells regulated through CalGEM primacy, procedures and cement plug placement will also adhere to regulations established within the California Code of Regulations, Chapter 4, Article 3, §1723.

Plugging Procedures*

The following procedures describe the proposed plugging operations:

1. Blowout Prevention Equipment (BOPE) is installed on the wellhead.
2. Downhole production or injection equipment is removed from the casing, and the well is cleaned out to Plugback Measured Depth (PBMD) or as deep as possible. The cleanout depth will be witnessed by CalGEM and approved.
3. Plug 1 will be placed from the approved cleanout depth across the production interval and >100' into the Reef Ridge shale. The plug will be tagged and witnessed by CalGEM to ensure the plug depth and length satisfies permit requirements.
4. Plug 2 will be placed at the top of the Etchegoin formation and >100' into the San Joaquin formation. The plug will be tagged and witnessed by CalGEM to ensure the plug depth and length satisfies permit requirements.
5. Plug 3 will be placed at the top of the San Joaquin formation. The plug will be extended to cover >100' above the base of the USDW. The plug will be tagged and witnessed by CalGEM to ensure plug depth and length satisfies permit requirements.
6. Plug 4 will be placed such that the surface plug is >25' in length, and well casing can be cut off between 5' and 10' from surface. The plug will be witnessed at surface by CalGEM to ensure plug depth and length satisfies permit requirements.
7. BOPE will be removed, and well casing will be cut between 5' and 10' below surface.
8. A steel plate will be stamped with the last five digits of the API well number for identification. The steel plate will be at least as thick as the outer well casing, and it will be welded around the circumference.

** These procedures are considered standard and are subject to change depending on the wellbore conditions. Any deviation from the permitted procedures affecting abandonment requirements will be conveyed, agreed upon and documented by CalGEM and CRC prior to the change.*

All portions of the well not plugged with cement are filled with inert mud meeting specifications according to California Code of Regulations, Chapter 4, Article 3, §1723(b). to prevent migration of fluids within the wellbore.

Plugging Details for Wells to be Abandoned

Well-specific plugging plans are provided in the following tables for each well to be abandoned prior to CO_2 injection. Cement type, volume, density, and placement method for each plug described above are indicated. The indicated top and bottom plug depths necessary to ensure isolation of A1-A2 sands and meet CalGEM abandonment requirements are determined based on the well-specific measured depths of the relevant geologic formations described above.

CTV is assessing the abandonment of two wellbores within the AoR that may be in communication with the A3+ reservoirs. CTV will provide detailed plugging procedures during pre-operational testing.

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	6.276	6.276	6.276	6.276	6	6.276	6.276	6.276
Bottom of tubing (ft)	9120	2848	1243	38	10312	3067	1554	39
Cement Volume (sacks)	116	24	133	5	292	24	140	5
Slurry Volume (bbl)	23.76	5.11	27.23	1.02	59.8	5.11	28.67	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8499	2723	535	13	8715	2942	809	14
Bottom of Plug (ft)	9120	2848	1243	38	10312	3067	1554	39
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	4	6.276	6.276	6.276	6	6.276	6.276	6.276
Bottom of tubing (ft)	9438	2948	1504	45	9978	2814	1456	39
Cement Volume (sacks)	75	24	138	5	234	24	144	5
Slurry Volume (bbl)	15.36	5.11	28.26	1.02	47.92	5.11	29.49	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8609	2823	773	20	8608	2689	688	14
Bottom of Plug (ft)	9438	2948	1504	45	9978	2814	1456	39
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	6.184	6.184	6.184	6.184	6	6.276	6.276	6.276
Bottom of tubing (ft)	9290	3180	1615	44	9863	3312	1601	39
Cement Volume (sacks)	76	24	137	5	250	24	130	5
Slurry Volume (bbl)	15.56	5.11	28.05	1.02	51.2	5.11	26.62	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8875	3055	864	19	8399	3187	910	14
Bottom of Plug (ft)	9290	3180	1615	44	9863	3312	1601	39
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	4	6.276	6.276	6.276	4	6.276	6.276	6.276
Bottom of tubing (ft)	9550	3108	1542	39	10550	2970	1441	34
Cement Volume (sacks)	106	24	141	5	209	24	140	5
Slurry Volume (bbl)	21.71	5.11	28.87	1.02	42.8	5.11	28.67	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8311	2983	792	14	8100	2845	699	9
Bottom of Plug (ft)	9550	3108	1542	39	10550	2970	1441	34
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	4	6.276	6.276	6.276	6	6.184	6.184	6.184
Bottom of tubing (ft)	10550	2908	1406	45	10357	2916	1467	42
Cement Volume (sacks)	192	24	138	5	300	24	134	5
Slurry Volume (bbl)	39.32	5.11	28.26	1.02	61.44	5.11	27.44	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8169	2783	670	20	8600	2791	733	17
Bottom of Plug (ft)	10550	2908	1406	45	10357	2916	1467	42
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	6.276	6.276	6.276	6.276	4.408	6.184	6.184	6.184
Bottom of tubing (ft)	9320	2895	1467	39	9925	2910	1446	41
Cement Volume (sacks)	158	24	24	5	130	24	135	5
Slurry Volume (bbl)	32.36	5.11	4.91	1.02	26.62	5.11	27.64	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8477	2770	1342	14	8627	2785	705	16
Bottom of Plug (ft)	9320	2895	1467	39	9925	2910	1446	41
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	6	6.184	6.184	6.184	6.184	6.366	6.366	6.366
Bottom of tubing (ft)	10397	2889	1437	39	9708	3201	1599	39
Cement Volume (sacks)	309	24	138	5	207	25	154	5
Slurry Volume (bbl)	63.28	5.11	28.26	1.02	42.39	5.11	31.54	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8588	2764	702	14	8567	3076	802	14
Bottom of Plug (ft)	10397	2889	1437	39	9708	3201	1599	39
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	4	6.366	6.366	6.366	6.184	6.184	6.184	6.184
Bottom of tubing (ft)	10653	3163	1561	41	10947	3157	1565	50
Cement Volume (sacks)	165	25	149	5	448	24	141	5
Slurry Volume (bbl)	33.79	5.11	30.51	1.02	91.75	5.11	28.87	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8482	3038	788	16	8476	3032	794	25
Bottom of Plug (ft)	10653	3163	1561	41	10947	3157	1565	50
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	4	6.366	6.366	6.366	6	6.366	6.366	6.366
Bottom of tubing (ft)	10218	2881	1399	45	10128	2928	1408	45
Cement Volume (sacks)	175	25	143	5	266	25	142	5
Slurry Volume (bbl)	35.84	5.11	29.28	1.02	54.47	5.11	29.08	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8068	2756	660	20	8585	2803	674	20
Bottom of Plug (ft)	10218	2881	1399	45	10128	2928	1408	45
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	6.276	6.366	6.366	6.366	6	6.366	6.366	6.366
Bottom of tubing (ft)	9319	2893	1409	39	9950	3383	1697	39
Cement Volume (sacks)	57	25	141	5	267	25	157	5
Slurry Volume (bbl)	11.67	5.11	28.87	1.02	54.68	5.11	32.15	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	9019	2768	680	14	8403	3258	885	14
Bottom of Plug (ft)	9319	2893	1409	39	9950	3383	1697	39
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	6.276	6.276	6.276	6.276	6.184	6.276	6.276	6.276
Bottom of tubing (ft)	9908	3367	1696	50	9361	3198	1596	39
Cement Volume (sacks)	209	24	154	5	144	24	151	5
Slurry Volume (bbl)	42.8	5.11	31.53	1.02	29.49	5.11	30.92	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8794	3242	876	25	8568	3073	791	14
Bottom of Plug (ft)	9908	3367	1696	50	9361	3198	1596	39
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	4.276	6.276	6.276	6.276	4	6.366	6.184	6.184
Bottom of tubing (ft)	9371	3135	1561	45	9024	3038	1514	39
Cement Volume (sacks)	111	24	148	5	70	25	151	5
Slurry Volume (bbl)	22.73	5.11	30.31	1.02	14.33	5.11	30.92	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8220	3010	774	20	8232	2913	732	14
Bottom of Plug (ft)	9371	3135	1561	45	9024	3038	1514	39
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	4.276	6.366	6.276	6.276	6.184	6.276	6.276	6.276
Bottom of tubing (ft)	9332	2981	1445	45	9135	2912	1407	45
Cement Volume (sacks)	105	25	142	5	116	24	139	5
Slurry Volume (bbl)	21.5	5.11	29.08	1.02	23.76	5.11	28.46	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8246	2856	691	20	8497	2787	668	20
Bottom of Plug (ft)	9332	2981	1445	45	9135	2912	1407	45
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	6.184	6.366	6.366	6.366	6.184	6.276	6.276	6.276
Bottom of tubing (ft)	9319	3014	1488	45	10294	2978	1443	50
Cement Volume (sacks)	168	25	148	5	339	24	141	5
Slurry Volume (bbl)	34.4	5.11	30.31	1.02	69.43	5.11	28.87	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8396	2889	722	20	8423	2853	696	25
Bottom of Plug (ft)	9319	3014	1488	45	10294	2978	1443	50
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]				[redacted]			
Plugs	Plug 1	Plug 2	Plug 3	Plug 4	Plug 1	Plug 2	Plug 3	Plug 4
Hole Size (in.)	4	6.276	6.276	6.276	6.184	6.276	6.276	6.276
Bottom of tubing (ft)	9716	3237	1598	50	9637	3152	1554	47
Cement Volume (sacks)	119	24	151	5	179	24	147	5
Slurry Volume (bbl)	24.47	5.11	30.92	1.02	36.66	5.11	30.1	1.02
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Top of plug (ft)	8400	3112	797	25	8653	3027	772	22
Bottom of Plug (ft)	9716	3237	1598	50	9637	3152	1554	47
Type of Cement	Class G	Class G	Class G	Class G	Class G	Class G	Class G	Class G
Method of placement	Balanced plug, Retainer, or CT plug				Balanced plug, Retainer, or CT plug			

Wells	[redacted]							
Plugs	Plug 1	Plug 2	Plug 3	Plug 4				
Hole Size (in.)	6.184	6.366	6.366	6.366				
Bottom of tubing (ft)	9113	2939	1347	45				
Cement Volume (sacks)	94	25	141	5				
Slurry Volume (bbl)	19.25	5.11	28.87	1.02				
Slurry Weight (lb/gal)	15.8	15.8	15.8	15.8				
Top of plug (ft)	8595	2814	617	20				
Bottom of Plug (ft)	9113	2939	1347	45				
Type of Cement	Class G	Class G	Class G	Class G				
Method of placement	Balanced plug, Retainer, or CT plug							